people. The responsibility of the health official therefore is plain. It is clear, however, from a review of the standards in use in different cities that the term has not as yet been satisfactorily defined. Among scientific men who have given the question careful study it is generally agreed that a temperature of 145° F. applied for thirty minutes is a safe standard but that anything less is not safe. It is seen from the facts set forth in this paper that streptococcus infected milk may present such a combination of conditions as to make a complete destruction of the organisms by any milder treatment quite uncertain. We feel justified in urging that these standards shall constitute the minimum for all pasteurized milk.

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ORGANIC HEART DISEASE—ITS DISTRIBUTION AND MENACE

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Read before the Section on Vital Statistics of the American Public Health Association at the Fifty-second Annual Meeting, Boston, Mass., October 10, 1923.

IN the international classification of causes of death there is a clear distinction made between the deaths from the acute forms of heart disease, such as pericarditis and acute endocarditis and those from the more chronic type which are classed as organic diseases of the heart.

This latter, therefore, represents a group of heart lesions of which probably the greater number are valvular lesions but also includes the degenerative diseases of the myocardium. In any discussion, however, of the causative factors of heart diseases as a group it is necessary to take into account the acute as well as the chronic forms. This would not, of course, include the degenerative disease of later life classed under angina pectoris and arteriosclerosis.

ORGANIC HEART DISEASE MORTALITY HIGH

Contrary to a certain amount of accepted belief, death from acute heart disease is not common. The census mortality figures for the United States registration area for 1920 show a rate of 8.8 per 100,000 population from pericarditis and acute endocarditis, both acute heart conditions. In the same year the death rate from organic heart disease was 141.9 per 100,000. Here is a rate over 16 times as high for the mortality from the more chronic forms of heart disease. In the acute group, however, there is a very much more recent relationship to the presence of certain epidemic diseases, the fatal results in these cases being more generally associated with some septic pyogenic process. On the other hand the fatal results of a chronic cardiac disease are brought about more by failure of the heart to function in a mechanical way. Although the original damage to the heart tissue, either muscular or nervous, was originally pathological, the failure to function is a physical defect which renders the heart a machine incapable of effective work.

"From the time of Harvey," says Clifford Allbutt, "although physiologists

have not asserted that mechanical conceptions can cover the whole phenomena of the circulation they have learned to see nevertheless that these conceptions cover so much of the ground that in mastering them they and their children may find reward enough." The mortality classification, therefore, into acute and chronic heart diseases recognizes a very commonly observed fact that death from chronic heart disease is not, except in a few instances, due to an acute disease but rather a gradual failure to function due to the defective apparatus of a damaged heart.

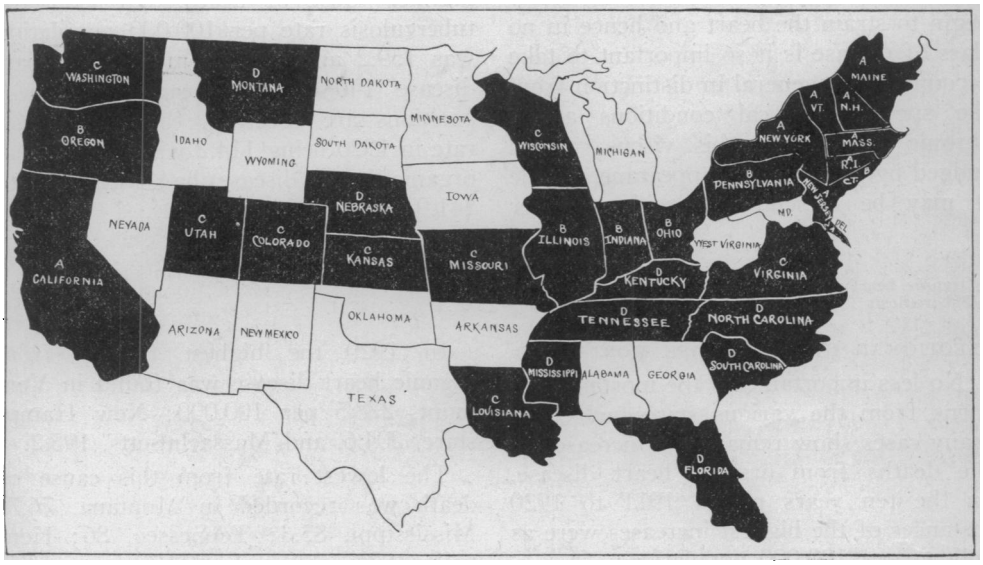
AGE DISTRIBUTION

The mortality from organic heart disease is essentially one of middle and advanced life; only a small proportion of the total deaths are recorded in the early years of life.

At the age period forty to forty-nine the mortality from organic heart disease in the United States registration area during 1920 was only exceeded by that due to tuberculosis and cancer. In the age period fifty to fifty-nine the deaths from heart disease were only exceeded by those from cancer. In all the age periods above sixty, heart disease was by far the commonest cause of death in the registration area. No more striking figures could be shown to illustrate the inability of the average individual to reach the three score years and ten of the biblical records. Although heart disease has been for many years a convenient term used to certify a cause of death, there is little reason to suppose that in the majority of cases the mortality from this cause is not accurately described. It is natural to assume that the "wear and tear" of active life will react more severely upon certain organs of the body than upon others.

AGE MORTALITY FROM ORGANIC HEART DISEASE, U. S. CENSUS 1920

All Ages	Under 10 years	10-19 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	70-79 years	80-89 years	90-99 years
124,123	2,015	2,874	3,589	5,906	9,664	16,285	29,025	33,978	18,229	2,337



MORTALITY FROM ORGANIC DISEASES OF THE HEART BY STATES PER 100,000
TABULATION BY THE U. S. BUREAU OF CENSUS FOR YEAR 1920

A—States having rates over 150 per cent.
B—States having rates over 125 per cent.
C—States having rate over 100 per cent.
D—States having rates under 100 per cent.
WHITE—States not recorded.

GREAT RESERVE POWER OF THE HEART

The physiology of the heart shows that this organ possesses a vast store of reserve power which has to be used up or the structure damaged to a great extent before function becomes impossible. According to Williamson[1] the heart "performs work each day equal to that done in raising 17,500 kilograms through a distance of one meter." In a lifetime of sixty years this amounts to the enormous total of 381,629,000 kilogram meters of work. Damage to such a machine must be very severe if it fails to function as intended by nature. It is natural to assume, however, that at the later age periods a heart damaged by valvular disease or degenerative myocarditis has perhaps reached the limit of its accommodation to the burden of life and only in rare instances can it be bolstered up by care and relief from strain to enable life to be prolonged.

According to Hare "an old valvular damage, however, soon becomes a serious matter when certain influences or states begin to strain the heart and hence in no class of disease is it so important to take account of the general in distinction from the special in local conditions as in chronic diseases of this viscus. Thus judged by post mortem appearances alone it may be difficult to decide whether valvular changes were the chronic results of acute processes or were caused by acute processes supervening upon chronic lesions.

THE EXTENT OF THE PROBLEM

The deaths from organic heart disease for the registration area of the United States during 1920 numbered 124,143, making a rate of 141.9 per 100,000 based on an estimated population of 87,486,713, or 82.3 per cent of the population of the United States. Ten years previously, in 1911, the deaths from this cause were 83,525 and the rate per 100,000 was 140.9. So remarkable has been the increased mortality from heart disease for the whole country that the Director of the Census notes in the 1920 report, "More deaths are reported as due to organic heart disease in each of the six years from 1915 to 1920 than to all forms of tuberculosis which previously held first place among causes of death."

For many years tuberculosis has headed our mortality records as the premier cause of death. In 1911 the tuberculosis rate per 100,000 population was 159.2 and that from organic heart disease 140.9. Ten years later these positions are reversed, the tuberculosis rate in 1920 being 114.2 whilst that from organic heart disease had increased to 141.9 per 100,000.

MORTALITY RATES FROM HEART DISEASES AND TUBERCULOSIS, 1915-1920

	1915	1916	1917	1918	1919	1920
Organic heart disease	147.6	150.6	153.8	153.3	131.0	141.9
Tuberculosis	146.3	142.1	147.1	150.0	125.6	114.2

SECTIONAL HEART DISEASE MORTALITY

No less important are the mortality returns from the various states, which in many cases show remarkable increases in the deaths from organic heart disease. In the ten years period 1911 to 1920 instances of the highest increases were as follows per 100,000 population:

	1911	1920
Washington	86.	115.8
Minnesota	89.4	113.7
New York	167.5	191.0
Utah	83.3	106.8
Maryland	142.1	165.1

In 1920 the highest fatality from organic heart disease was found in Vermont, 228.5 per 100,000; New Hampshire, 204.6, and Massachusetts, 195.2.

The lowest rate from this cause of death was recorded in Montana, 76.7; Mississippi, 85.3; Tennessee, 86; Kentucky, 87.6; Nebraska, 92.7.

In the 66 registration cities of 100,000 population and over the greatest increase in mortality from this cause during the ten years period 1911 to 1920 was:

	1911	1920
Syracuse	168.2	215.8
Boston	192.8	233.7
Minneapolis	95.1	130.2
Grand Rapids	123.0	155.6

The highest rates in the Census Bureau figures for 1920 for the registration cities were:

Boston	233.7	per	100,000	population
Albany	228.2	"	"	"
Worcester	227.6	"	"	"
Syracuse	215.8	"	"	"
San Francisco	212.2	"	"	"

The unusually high mortality from heart disease in the three New England states, Vermont, Massachusetts and New Hampshire, is remarkable. A similar predisposition to this cause of death. is seen in the two northern cities of Boston and Syracuse. The lowest rates were those of southern or middle western states.

THE PREVALENCE OF HEART DISEASE

To what extent heart disease is present in a population can only be very indefinitely estimated. In a report of the New York Association for the Prevention and Relief of Heart Disease, Emerson gives the results of an investigation of the attendance at ten large general hospitals in New York City and 43 special cardiac clinics. In this report it was found that 4.58 per cent of patients admitted to these hospitals in one year were cardiac cases. It is Emerson's belief[2] that 2 per cent of the people of all ages and sexes are suffering from heart disease. This would mean an army of 2,000,000 persons in the United States having some form of heart disease in its various stages of disability. Among 2,510,706 men examined in the draft during the World War 88,000 were found suffering from valvular disease of the heart. About 5.5 per cent of all the men had noteworthy defects of the valves or blood vessels. This is about 10 per cent of all defects found.[3] Examination of 139,770 children[4] over six years old in New York schools in 1921 showed that the incidence of heart disease for all cases examined, was 1.4 per cent or a total of 5,730 at this age period.

The incidence found to exist among school children is significant of the damaged hearts existing at early ages and which in the later age periods is responsible for the incapacity and mortality of the wage earners. About 2 per cent of all persons examined by insurance companies are rejected each year on account of cardiac defects.[5] A similar percentage of incidence was found to exist among the garment workers of New York by J. W. Schereschewsky.

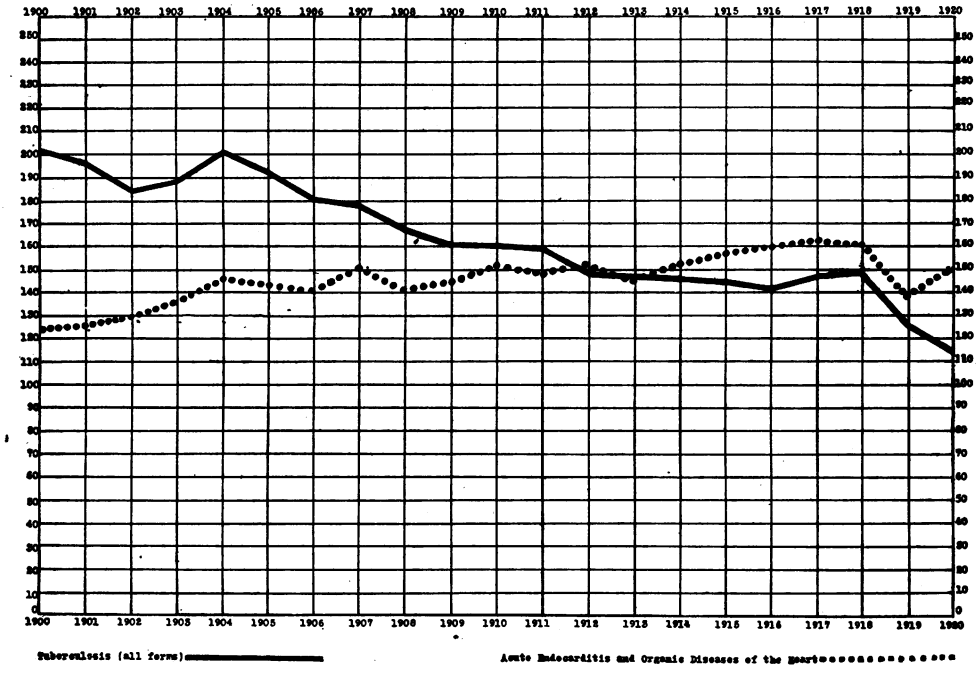
THE CAUSES OF HEART DISEASE

The great destruction of life as a result of heart disease is not brought about with few exceptions by acute processes during adult life but rather as a result of progressive incapacity of the heart mechanism consequent upon serious damage at some previous age period. It is very generally agreed that this occurs during infancy and early childhood. The known diseases affecting the heart are rheumatism, chorea, scarlet fever, diphtheria and possibly whooping cough. In the case of the three epidemic diseases quarantine and isolation methods are widely enforced with the result that medical examination of the chest and heart is a routine procedure with most physicians. This in itself is a safeguard against undetected heart disease and assures the patient, in the majority of cases, skilled advice and treatment.

RHEUMATISM AS A CAUSE

The incidence of acute and chronic heart lesions found to exist during and after attacks of rheumatism justifies us in regarding this affection as the reservoir, so to speak, from which most organic heart disease is transmitted to the individual. There is no more insidious disease than rheumatism which manifests itself under a variety of grades of severity from the untreated "growing pains" of young children, the oft repeated sore throat and stiff neck of young adults, to the grave infection known as rheumatic fever with its immediate menace to the patient's life.

MORTALITY FROM TUBERCULOSIS (ALL FORMS), ACUTE ENDOCARDITIS AND ORGANIC DISEASES OF THE HEART IN THE REGISTRATION AREA OF THE UNITED STATES 1900-1920—RATE PER 100,000 POPULATION



In a series of 172 cases of rheumatism recorded by Poynton[6] 66 per cent of the children had signs of organic heart disease, 22 per cent died and 38 per cent became complete invalids. A still higher incidence of heart involvement in rheumatism is asserted to occur by Holt.[7] In 117 cases of endocarditis 90 per cent gave a history of previous rheumatism. Among 150 cases of valvular disease of the heart described by Still a rheumatic history was found in 142 instances.

Whilst heart involvement occurs most frequently in acute rheumatism, endocarditis may be present with no symptoms sufficiently urgent to attract attention of parent or physician. "It may occur or follow chorea, tonsilitis, or oral sepsis with or without articular symptoms. The proportion of rheumatic cases in which endocarditis occurs is much larger in children than in adults. In rare instances endocarditis is seen in the course of almost any of the infectious diseases most frequently with scarlet fever, being often associated with pericarditis; but even in these conditions it is possible that it is sometimes rheumatic."[7]

That rheumatism is a cause of disability among industrial workers was shown to be the case in the various sickness surveys of Rochester, Boston, Pennsylvania, North Carolina. Among the white population of Pennsylvania, the incidence rate was 127.9 per 100,000 exposed. Among the colored in the same area and in West Virginia the rate was as high as 246.5. The average rate appeared to be 164.4 per 100,000 exposed.[8] The high rate among the colored is significant of the relationship between rheumatism and cardiac disease, this latter rate being much higher among the negro than the white population of the Southern States.

IS RHEUMATISM AN INFECTIOUS DISEASE?

In its behavior and certain peculiarities rheumatism has many of the characteristics of an infectious disease. Close

individual contact, overcrowding and defective personal hygiene appear to influence considerably the prevalence of rheumatism and its disabling complications especially among children. "As soon as school age is reached," says Poynton,[9] "we find a steady increase in the frequency of incidence. On the other hand acute rheumatism is infrequent among children of school age of parents who are in better circumstances than the hospital class."

Of the agency causing the group of rheumatic symptoms little is known. Various bacteria mostly of the coccus form have been described. Small bacteria of this nature were observed in rheumatic lesions by Triboulet and by Westphal and Wassermann. It is likely that the diplococcus isolated by Poynton and Paine[10] by culture from the tonsils of cases of rheumatic fever is the same or similar organism. By injection into rabbits, lesions were produced which suggested a similar infection to rheumatism.

Other investigators have found various types of streptococci in rheumatic joints and other rheumatic lesions. In 1913 Rosenau[11] isolated a streptococcus from rheumatic cases with similar pathogenic powers upon animals as the Poynton and Paine diplococcus. Whether the types of bacilli isolated are directly responsible for the rheumatic condition or are secondary invaders is still a matter of conjecture. At least the group of rheumatic symptoms resembles somewhat the conditions existing in known septic conditions produced by the streptococcus family. Certain it is that the marked anemia present in most rheumatic cases is significant of the hemoglobin destroying streptococcus.

Osler is of the opinion that not only does rheumatism become epidemic at times but it possesses features suggestive of septic infection, "in the character of the fever, the arthritis, the tendency to relapse, the sweats, the anemia, the leucocytosis, and above all in the great liability to endocarditis and to involvement of the serous membranes, the disease resembles pyaemia."

CHOREA (ST. VITUS' DANCE)

The association of chorea with rheumatism is now generally acknowledged. So constant is the relationship that the disease has been termed a meningomyelitis of rheumatic origin. The observation of clinicians supports this view inasmuch as in many cases there is a history of an arthritis or joint inflammation preceding the attack of chorea by months or years. In a number of observations the chorea has immediately followed upon rheumatic symptoms. About a quarter of all cases of chorea have definite rheumatic histories in the opinion of Gowers[12] and Rogers.[13] Seventeen per cent of such rheumatic history was observed by B. Sachs[14] and 21 per cent by Osler.[15]

REMEDIAL MEASURES

Since the time of Sydenham the sufferer from heart disease has been subjected to useless if well meaning therapeutic measures. Bleedings with the lancet and dosings with mercurial preparations were remorselessly carried out on early victims. A noted physician even at this period admitted that "many seem to recover under any treatment or even with none at all." The claims of digitalis and strophanthus to be sovereign remedies for heart affections have not been substantiated so that in the words of Poynton "Curative treatment for the moment is almost at a standstill."

The medical profession has long regarded a damaged heart as incurable. Medical efforts at relief of symptoms are now more generally directed to the care of the patient not only in the physical but also in the social sense. Great strides have been made in recognizing the special treatment and nursing necessary for the cardiac cripple. In the survey made by Emerson for the New York Association for the Prevention and Relief of Heart Disease covering ten New York hospitals the requirement of more hospital beds for

these patients was emphasized. The situation was found to be unsatisfactory. Among the 98,828 patients treated in the ten hospitals 4,502 patients, or 4.58 per cent of all admitted, were sufferers from heart lesions.

The need for convalescent homes is apparent as well as an adequate social service follow-up which would include careful supervision of suitable occupations for patients whose hearts have progressed toward functional compensation. The beneficial results of such hospital treatment as was available was shown in the 51.04 per cent of the patients who improved, although the mortality was high—36.4 per cent. Emerson concludes that "not less than six and probably twelve beds are needed for convalescent care of heart patients per 100,000 population, and that the duration of such convalescent care will be at least three weeks per case."

Pioneer work of great value in combating heart disease has been carried out in New York by the Burke Relief Foundation. Through its Sturgis Research Fund steps were taken to assist in the foundation of a National Cardiac Association as well as in the setting up of vocational guidance for sufferers from heart disease. In its convalescent home 300 beds are devoted to patients with cardiac defects. Since 1915, 5,000 such cases were treated by specialized methods for recuperation. This institution, a model of its special type, includes in its regime "rest, graduated exercise, continuation schooling, recreation, occupational therapy and beginning vocational guidance and usually some mental and nerve readjustments."

CLINICAL STUDY

Opportunity for the clinical study of heart disease both for the student of medicine and for post graduate teaching is sadly lacking in our great city hospitals as the demand for hospital beds is so urgent that the cardiac case is turned out as quickly as severe symptoms have abated and some form of compensation has been established. The inadequacy of this treatment is evident in the frequent returns of these cases for medical treatment until finally there results the totally disabled individual with a decompensated heart and a definite exhaustion of all reserve powers.

In no other disease disability is rest so necessary for recompensation as in heart disease. It is for this reason that the majority of cardiac patients require more extended hospital treatment. Quicker diagnosis of heart lesions would result in earlier and more effective rehabilitation of such cases. Convalescent hospitals where treatment could be taken for long periods of observation are recommended by Emerson,[2] Poynton,[9] and Moon.

IS PREVENTION POSSIBLE?

If we look upon the mortality from organic heart disease as a failure of heart function due to cardiac damage at some period of life, the removal of such causes, if possible, would appear to be a logical and distinctly worth-while effort. In the majority of cases of heart disease the association of rheumatism has been established. Rheumatism, as has been stated previously, has all the earmarks of an infectious communicable disease. If this is so, then preventive measures hold out the most reasonable hope of control. So widespread is the disease, however, in city communities and so mild the majority of its symptoms, especially in children, that the public has no knowledge of its insidious onset and remarkable dangers.

The relationship of chorea and rheumatism with heart disease should be stressed in all public health literature. Teachers and school nurses can well be instructed in the importance of chorea and rheumatism as a definite indication of a diseased heart. Parents and relatives are inclined to treat "growing pains" in children as of no moment, whereas they may be like frequent attacks of tonsilitis, heralds of an invasion of the heart with the rheumatic virus.

A PUBLIC HEALTH PROBLEM

There can be little dissent from the opinion that rheumatism, chorea and heart disease are public health problems of the first importance and their solution one which public health administrators should make every effort to accomplish.

Suitable information upon these ailments should be distributed by all health departments by lectures, posters and circulars. The following circular of information is suggested, which might be adopted as part of the ordinary health propaganda among physicians, nurses, schools and institutions:

HEART DISEASE PREVENTION

1. Heart disease is nearly always the result of rheumatic attack in childhood, either acute or chronic.
2. Rheumatism is an infectious disease caused by bacteria and is most prevalent in spring and fall months.
3. "Growing pains" and frequent "sore throats" are usually symptoms of a rheumatic attack.
4. Chorea or St. Vitus' dance is rheumatism of the nerve centers and is almost invariably accompanied by heart involvement.
5. Permanently enlarged tonsils and adenoids are the gateways through which the rheumatic virus gains entrance.
6. The heart is most frequently damaged during childhood and permanently disables the child in after-life.
7. A nervous child may readily be the victim of a previous attack of rheumatism or heart disease.
8. A child suffering with a damaged heart requires special school work with graded rest periods.
9. If properly cared for in the early stages the individual with heart disease may look forward to the normal span of life as a useful member of the community.
10. Cardiac cases are not normal individuals and chronic invalidism may wait upon ignorant treatment of the disease in its initial stages.
11. Medical examination should be advised for all rheumatic or nervous children.
12. Do not neglect childish complaints of tiredness, aching limbs or disinclination to work or play. It is safer to be sure. Call a physician.

Finally, as it is an accepted axiom that the public health official can not combat a disease unless he knows of its prevalence and as the mortality from heart disease indicates only the end results of infective processes beginning in early life, a proper control of heart disease will be possible only if such diseases as rheumatism in all its forms, tonsilitis, and chorea be made reportable to the local health authorities.

SUMMARY

1. One hundred twenty-four thousand, one hundred forty-three deaths occurred in the registration area from organic heart disease during 1920.

2. The death rate from organic heart disease for 1920 was 141.9 per 100,000. Ten years previously the rate was 140.9.

3. More deaths reported now from heart disease than from tuberculosis, which formerly held the premier position in United States mortality.

4. Ten years ago the rate from tuberculosis was 159.2 and organic heart disease 140.9 per 100,000. In 1920 the figures were reversed: tuberculosis, 114.2, and organic heart disease, 141.9 per 100,000.

5. Highest fatality from heart disease found in the states of Vermont, New Hampshire and Massachusetts. Lowest in Montana, Mississippi, Tennessee, Kentucky and Nebraska.

6. Cardiac disease estimated to be present in 2 per cent of all the general population in the United States.

7. Among 139,770 New York school children 1.4 per cent were found to be cardiac sufferers.

8. Rheumatic attacks the main cause of all chronic heart lesions. Sixty per cent of such cases show heart lesions according to Poynton.

9. Rheumatism has all the appearances of an epidemic infectious disease as

shown by the fever, arthritis, sweats, anemia and leucocytosis.

10. Medical effort now directed principally to the relief of symptoms both physically and in social sense.

11. Better opportunity for the clinical study of heart disease required in our hospitals and clinics.

12. If rheumatism is a communicable disease it is also preventable by the usual methods of care of the public by isolation and quarantine.

13. Great need for publicity and education of the public in the danger to the child of rheumatism, growing pains, chorea and repeated sore throats.

14. Rheumatism, tonsilitis and chorea should be made reportable to the local health authorities.

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THE ANNUAL CONFERENCE OF STATE AND TERRITORIAL HEALTH OFFICERS WITH THE UNITED STATES PUBLIC HEALTH SERVICE

May 16 and 17, 1923.

THE outstanding features of the 1923 Conference of State and Territorial Health Officers were a discussion of the infancy and maternity work being carried on by the state departments of health, mosquito control work in the South, the investigative activities of the Public Health Service in the various states, the education of medical students in public health work, and an address by Doctor Ludwik Rajchman of the Health Section of the League of Nations.

The Surgeon-General, in his opening address, reported that the work of the Service is growing, particularly in respect to activities being carried on in coöperation with other health services of the federal government, but that the commissioned personnel had not increased in numbers. The investigations made by the Service of yellow fever in Mexico and the necessity for the strict quarantine imposed by the Service were explained. In the opinion of the Surgeon-General, typhus fever and other serious diseases which have been epidemic in Europe have been kept out of the United States largely because of the activities of Service officers in Europe.

Doctor Mary Riggs Noble,* of Pennsylvania, Doctor W. S. Rankin,* of North Carolina, and Doctor L. L. Lumsden, of the Public Health Service, were among the principal speakers to deal with the subject of maternity and infant hygiene. Doctor Noble spoke of the work of the 400 child health centers in Pennsylvania, about 50 per cent of which are controlled by private agencies, the balance being under state control. She emphasized the importance of prenatal clinics. A prospective mother has four rights, said Doctor Noble: first, a complete physical examination; second, a regular periodic urinalysis; third, a blood pressure examination at regular intervals; and, fourth, a Wassermann test so that she may prevent a transmission of syphilis to her offspring.

Dr. Noble's remarks regarding midwives aroused considerable discussion. It revealed a very unsatisfactory condition of affairs in the United States regarding the control of midwifery. The discussion was illuminating, but it is to

* Papers by Doctors Noble and Rankin will be found in the September issue of this JOURNAL.